Progress Energy

APR 2 1 2012

SERIAL: BSEP 12-0045 10 CFR 50.73

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Subject: Brunswick Steam Electric Plant, Unit No. 1
Renewed Facility Operating License No. DPR-71
Docket No. 50-325
Licensee Event Report 1-2012-001

Ladies and Gentlemen:

In accordance with the Code of Federal Regulations, Title 10, Part 50.73, Carolina Power & Light Company, now doing business as Progress Energy Carolinas, Inc., submits the enclosed Licensee Event Report (LER). This report fulfills the requirement for a written report within sixty (60) days of a reportable occurrence.

Please refer any questions regarding this submittal to Mr. Lee Grzeck, Acting Supervisor - Licensing/Regulatory Programs, at (910) 457-2487.

Sincerely,

Joseph M. Frisco, Jr.
Plant General Manager
Brunswick Steam Electric Plant

MAT/mat

Enclosure:

Licensee Event Report

Progress Energy Carolinas, Inc.
Brunswick Nuclear Plant
P.O. Box 10429
Southport, NC 28461

IE22
NRR

cc (with enclosure):

U. S. Nuclear Regulatory Commission, Region II
ATTN: Mr. Victor M. McCree, Regional Administrator
245 Peachtree Center Ave. N.E., Suite 1200
Atlanta, GA 30303-1257

U. S. Nuclear Regulatory Commission
ATTN: Mr. Philip B. O'Bryan, NRC Senior Resident Inspector
8470 River Road
Southport, NC 28461-8869

U. S. Nuclear Regulatory Commission **(Electronic Copy Only)**
ATTN: Mrs. Farideh E. Saba (Mail Stop OWFN 8G9A)
11555 Rockville Pike
Rockville, MD 20852-2738

Chair - North Carolina Utilities Commission
P.O. Box 29510
Raleigh, NC 27626-0510

NRC FORM 366 (10-2010) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 10/31/2013

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA/Privacy Section (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects.resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

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4. TITLE

Manual Reactor Protection System Actuation in Anticipation of a Loss of Condenser Vacuum

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
02	22	2012	2012	– 001 –	00	04	21	2012	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE

1

10. POWER LEVEL

073

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*

☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☒ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER
☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER *(Include Area Code)*
Mark Turkal, Lead Engineer - Licensing	(910) 457-3066

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

On February 22, 2012, at 2319 hours Eastern Standard Time (EST), a manual Reactor Protection System (RPS) actuation was inserted on Unit 1 in anticipation of a loss of condenser vacuum. Shortly before the manual RPS actuation, Circulating Water Intake Pump (CWIP) 1B tripped due to high delta-pressure across the intake traveling screen. This caused the trip of the remaining Unit 1 CWIPs. Previously, at 1859 hours, balance of plant (BOP) bus Common C unexpectedly de-energized. This resulted in a loss of power to the CWIP traveling screen motors which, in turn, lead to the high delta-pressure across the traveling screens. As a result of the scram, reactor water level reached the Reactor Vessel Water Level - Low Level 1 actuation set point and Primary Containment Isolation System (PCIS) Groups 2 and 6 isolations occurred. Additionally, the Main Steam Isolation Valves (MSIVs) (i.e., PCIS Group 1) were manually closed prior to reaching the Condenser Vacuum - Low actuation set point.

This condition is being reported in accordance with 10 CFR 50.73(a)(2)(iv)(A) as an event that resulted in manual actuation of the RPS system and automatic and manual actuations of PCIS.

The root cause of this event is inadequate preventive maintenance (PM) for the 4160/480 V transformer associated with the Common C BOP bus. Corrective actions include the establishment of appropriate PM tasks for the 4160/480 V transformers.

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NARRATIVE

Energy Industry Identification System (EIIS) codes are identified in the text as [XX].

Introduction

Initial Conditions

At the time of the event, Unit 1 was in Mode 1, at 73 percent of rated thermal power (RTP). Offsite power and the four Emergency Diesel Generators (EDGs) [EK] were operable. The A loop of the Core Spray (CS) system [BM] and the A and B loops of the Residual Heat (RHR) system [BO] had been declared inoperable due to low discharge pressure alarms. The High Pressure Coolant Injection (HPCI) [BJ] system, the Automatic Depressurization System (ADS), and the Reactor Core Isolation Cooling (RCIC) [BN] system were operable.

Reportability Criteria

On February 22, 2012, at 2319 hours Eastern Standard Time (EST), a manual Reactor Protection System (RPS) [JC] actuation was inserted on Unit 1 in anticipation of a loss of condenser vacuum. As a result of the scram, reactor water level reached the Reactor Vessel Water Level - Low Level 1 actuation set point and Primary Containment Isolation System (PCIS) [JM] Groups 2 and 6 isolations occurred. Additionally, the Main Steam Isolation Valves (MSIVs) (i.e., PCIS Group 1) were manually closed prior to reaching the Condenser Vacuum - Low actuation set point. This condition is being reported in accordance with 10 CFR 50.73(a)(2)(iv)(A) as an event that resulted in manual actuation of the RPS and automatic and manual actuations of PCIS. The NRC was initially notified of this event on February 23, 2012 (i.e., Event Number (EN) 47690). EN 47687, completed at 2336 hours on February 22, 2012, provides additional information regarding the initiation of the event when the balance of plant (BOP) bus Common C [EA] had unexpectedly de-energized at 1859 hours.

Event Description

On February 22, 2012, at 1859 hours, BOP bus Common C unexpectedly de-energized. As a result, power was lost to the Demineralized Water Transfer pumps [KC] for Units 1 and 2, the Unit 1 Circulating Water Intake Pump (CWIP) traveling screens, and multiple Unit 1 Circulating Water System control systems and supporting functions [KE]. The loss of Demineralized Water Transfer Pumps caused a loss of keepfill to low pressure Emergency Core Cooling Systems (ECCSs). The loss of power to the Unit 1 CWIP traveling screen motors lead to the high delta-pressure across the traveling screens. Work crews were dispatched to manually rotate the screens. However, this activity could not be established before the Hi-Hi delta pressure trip set point of 48 inches was reached and 1B CWIP tripped. Within approximately 30 seconds, the 1C and 1D CWIPs also tripped and a manual RPS actuation was inserted on Unit 1 in anticipation of a loss of condenser vacuum.

LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET

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Event Description (continued)

As a result of the Unit 1 manual RPS actuation, reactor water level reached the Reactor Vessel Water Level - Low Level 1 actuation set point and PCIS Groups 2 and 6 isolations occurred. Additionally, the MSIVs (i.e., PCIS Group 1) were manually closed prior to reaching the Condenser Vacuum - Low actuation set point. With the closure of the MSIVs, RCIC and HPCI were operated manually, as necessary, for Reactor Coolant System level and pressure control, respectively. No automatic RCIC or HPCI initiation signals were received. No Safety/Relief valves lifted or were manually operated in response to the Unit 1 manual RPS actuation.

Event Cause

The root cause of this event is inadequate preventive maintenance for the 4160/480 V transformer associated with the Common C BOP bus.

The direct cause of the loss of the Common C BOP bus was failure of its 4160/480 V transformer. Investigation of the failed transformer identified that the X2 winding (i.e., center phase, low voltage) was faulted on the innermost windings against the core. Insulation resistance testing revealed short circuits from the winding to the core and the ground clamping structure. This was at least partially attributable to the fault, but the condition of the core ground strap indicated an unintentional ground may have existed for an extended time. An unintentional ground would have increased the temperature of the transformer. The insulation between the secondary winding and core was severely degraded. Heat damage and degradation was found throughout the windings and core of the transformer, including the non-faulted phases. Arcing over time has occurred between the steel core clamping plates and the innermost X3 winding (i.e., right phase, low voltage). The plates were warped from heating and were pushing into the winding.

Based on the above, it was concluded that the preventive maintenance associated with the 4160/480 V transformer was inadequate. Specifically, preventive maintenance procedure 0PM-XMR001, "ITE Substation Transformers," does not include a core ground check or monitor for signs of overheating on the core clamping structure nor did the performance monitoring include a comparison to initial design data. As a result, deterioration was not detected before the transformer failed.

Safety Assessment

The safety significance of this event was minimal. Operators took appropriate actions in response to the Common C bus failure. The manual RPS actuation was initiated in advance of relying upon automatic design features. HPCI and RCIC were operated manually and operated per design for reactor coolant system pressure and level control, respectively.

Although use of low pressure ECCS was not required to respond to this event, the loss of Demineralized Water Transfer Pumps and loss of keepfill was evaluated to determine its impact on ECCS and RCIC

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NARRATIVE

Safety Assessment (continued)

systems. While low pressure ECCS systems were considered inoperable when low discharge pressure alarms were received, the systems were available and able to perform their intended safety function. Most scenarios requiring these systems to inject will cause the systems to start, either automatically or by operator action, within a matter of minutes. Excessive voiding in the injection lines would not occur in this timeframe. Evaluation of data from the February 22, 2012, event demonstrates that in the event of delayed system starts, the systems would reach equilibrium (i.e., negligible check valve backleakage) before causing voids that would prevent the system from performing its injection function.

Corrective Actions

The following corrective actions to prevent recurrence are planned.

- Revise preventive maintenance procedure 0PM-XMR001, "ITE Substation Transformers," to require: (1) performance of core ground testing and (2) inspection for discoloration and signs of overheating on core clamping structure. This revision is currently scheduled to be completed by June 28, 2012.
- Establish and implement ITE Substation Transformer monitoring which includes: (1) thresholds for temperature monitoring based on transformer loading using vendor data, theoretical knowledge, engineering judgment, and comparison to the entire population of the same transformers and (2) required actions once thresholds are reached or exceeded. This action is currently scheduled to be completed by June 28, 2012.

Previous Similar Events

A review of LERs and corrective action program condition reports for the past three years did not identify any similar previous occurrences.

Commitments

No regulatory commitments are contained in this report.